



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

*lh*

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,176	07/15/2003	Michael A. Bryan	3275.03US02	8641

24113 7590 10/03/2005

PATTERSON, THUENTE, SKAAR & CHRISTENSEN, P.A.  
4800 IDS CENTER  
80 SOUTH 8TH STREET  
MINNEAPOLIS, MN 55402-2100

EXAMINER

KALIVODA, CHRISTOPHER M

ART UNIT PAPER NUMBER

2883

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/620,176		BRYAN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Christopher M. Kalivoda		2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-22, 24-39 and 53-63 is/are pending in the application.
- 4a) Of the above claim(s) 1-16, 29-39 and 53-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-22 and 24-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of Species 2, claims 17-28 in the reply filed on July 28, 2005 is acknowledged. The traversal is on the ground(s) that the search is not burdensome since the species are classified in the same class and subclass. This is not found persuasive because there are multiple species claimed. Each of the independent claims contains limitations not found in the other independent claims thus making the claims mutually exclusive and burdensome to search.

Newly submitted claims 53-63 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Independent claim 53 contains limitations not claimed in claim 17 and vice versa.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 53-63 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

The requirement is still deemed proper and is therefore made FINAL.

### ***Response to Arguments***

Applicant's arguments filed July 28, 2005 have been fully considered but they are not persuasive. With respect to the first argument (page 13, 2<sup>nd</sup> paragraph), that Payne (U.S. 6,160,944) does not teach that irradiation is performed for a period of time with

Art Unit: 2883

light having an intensity and wavelength to induce the gradient index of refraction along an irradiation direction, the examiner respectfully disagrees. As seen in column 7, lines 12-14 and 18-22, both times and intensities are described to write the grating and the light has a wavelength. There is no reason to believe that specific times and intensities would not be used to create the gradient in index of refraction as well. This is at least implied.

With respect to the second argument that Payne does not teach a gradient (page 14, paragraph 3, lines 4-6), the examiner respectfully disagrees. As seen in col 3, lines 6-12, there can also be a linear refractive index variation along the length of the waveguide. This is interpreted to mean a gradient since the text suggests a graph, with the refractive index along the vertical axis and length along the horizontal axis. The curve is a straight line (linear) extending at some angle between the two axes.

The previous objection to the claims and drawings are withdrawn.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-22 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Payne et al., U.S. Patent 6,160,944.

Regarding independent claim 17, Payne et al. teach a method for producing a gradient in index of refraction in an optical material comprising a photosensitive optical material (col 8, lines 12-15 and Fig 5, ref sign 210), the method comprising irradiating (col 3, lines 6-12, especially line 12) the photosensitive optical material to create a light-induced gradient in index of refraction (col 3, lines 6-12, especially lines 8-9 "linear refractive index variation").

However, the reference is silent with respect to the irradiation of the photosensitive optical material is performed for a period of time with light having an intensity and wavelength to induce the gradient index of refraction.

Payne teaches specific irradiating times and intensities to write a grating (col 7, lines 12-14 and 18-22).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to irradiate the photosensitive optical material for a period of time with light having an intensity and wavelength to induce the gradient index of refraction along an irradiation direction.

The motivation is to induce the gradient as well as not damage the device (col 7, lines 21-24).

Regarding claim 18, the optical material comprises a planar optical structure (Fig 5, ref sign 230). In addition, the irradiation is along a length (col 3, lines 6-9, especially line 9)

Regarding claim 19, Payne et al. teach the limitations of claim 18 as described above. Furthermore, the gradient in index of refraction is oriented along the plane of the structure since it is generated along a length of waveguide (col 3, lines 6-12, especially line 9).

Regarding claim 20, Payne et al. teach the limitations of claim 18 as described above. While the reference does not specifically state "oriented perpendicular to the plane of the structure", there would be a gradient oriented perpendicular to the structure as well since radiation is absorbed as it passes through the photosensitive material and more absorption occurs as the radiation passes through more material (i.e. the deeper into the material).

Regarding claim 21, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the optical material can also comprise a preform (col 4, lines 58-61 and Fig 1, ref sign 100). In addition, the aspect ratio ( $a=L/D$ ) is clearly at least about 5 since the diameter is about 5 microns (col 6, line 50) and the length is measured in kilometers (col 6, line 51).

Regarding claim 22, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the photosensitive optical material comprises at least about 1 mole percent germanium as a fraction of the total metal/metalloid content of the photosensitive optical material (col 5, line 22).

Regarding claim 23, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the irradiating is performed for a selected time of period with light having an intensity (col 8, line 23 since saturation is controlled) and wavelength (col 4,

lines 36-39 since UV light is selected) to induce the gradient index of refraction along the irradiation direction.

Regarding claim 24, Payne et al. teach the limitations of claim 23 as described above. Furthermore, the light intensity and composition of the photosensitive material produce absorption of light in the linear Beer's law regime of spatial variation since saturation may not occur (col 8, lines 23-27).

Regarding claim 25, Payne et al. teach the limitations of claim 23 as described above. Furthermore, the light intensity and composition of the photosensitive material produce absorption of light with non-linear spatial variation since saturation can occur (col 8, lines 23-27).

Regarding claim 26, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the photosensitive optical material comprises a gradient composition of a dopant that induces photosensitivity of the material wherein the composition gradient results in the index-of-refraction gradient following illumination (col 3, lines 8-9 "linear refractive index variation") since there is a linear gradient refractive index and the photosensitive material changes refractive index upon illumination (col 3, lines 11-12).

Regarding claim 27, Payne et al. teach the limitations of claim 17 as described above.

However, the reference is silent with respect to the gradient extending across a distance of at least 10 microns.

Payne et al. does teach that a gradient can be used in a beam-size adjusting device to change the size of a guided beam (col 3, lines 6-12).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Payne et al. to have the gradient extending across a distance of at least 10 microns in order to reduce the beam diameter to small diameters.

The motivation is to increase intensity.

Regarding claim 28, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the gradient in index or refraction is at least about  $1 \times 10^{-8}$  index units per micron since index changes of  $1 \times 10^{-3}$  (col 7, lines 43-44) over 15 mm (col 7, lines 14-15) are contemplated and  $1 \times 10^{-3} / 15 \times 10^3$  microns is about  $6.7 \times 10^{-8}$  index units per micron.

In addition, in an effort to provide Applicant with the best available art, the following rejections of at least the independent claim can be made.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States



only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 17 is rejected under 35 U.S.C. 102(e) as being anticipated by Zhou, et al., U.S. Patent Application Publication 2002/0048727. Please note, the effective filing date of October 20, 2000 predates Applicant's priority date.

Regarding independent claim 17, Zhou et al. teach a method for producing a gradient in index of refraction in an optical material comprising a photosensitive optical material (para 22, lines 1-3), the method comprising irradiating the photosensitive optical material (para 22, lines 3-6) to create a light-induced gradient in index of refraction (para 34, lines 9-14) wherein the irradiation of the photosensitive optical material is performed for a period of time with light having an intensity and wavelength (para 31, lines 1-7) to induce the gradient index of refraction.

### **Conclusion**

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any


extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 4,514,043 to Borrelli et al., U.S. Patent 6,542,690 to Ellison et al. and U.S. Patent 4,907,864 to Hagerty et al. each describe using UV light to produce a light-induced gradient index of refraction as in claim 1. U.S. Patent 4,877,717 to Suzuki et al. describes using UV to change refractive index of materials.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Kalivoda whose telephone number is (571) 272-2476. The examiner can normally be reached on Monday - Friday (8:30 - 5:00). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Frank G. Font  
Supervisory Patent Examiner  
Technology Center 2800

  
CMK 9-24-05